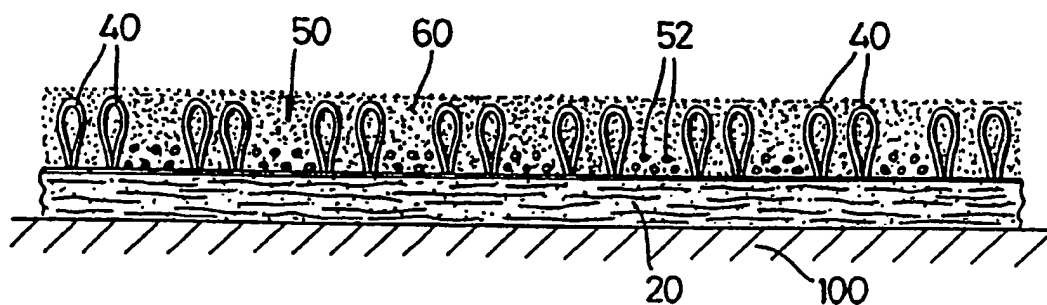




## INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

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(54) Title: GROUND STABILISATION MATERIAL



## (57) Abstract

A needle punched fabric (10) is provided with rows of loops of fibres (40, 46) upstanding from the base of the fabric (20) to thereby form furrows (50) within which particulate material (60) may be positioned, the furrows providing protection for grass seeds (52) which may be planted therein.

# + DESIGNATIONS OF "SU"

Any designation of "SU" has effect in the Russian Federation. It is not yet known whether any such designation has effect in other States of the former Soviet Union.

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GROUND STABILISATION MATERIAL

The present invention relates to ground stabilisation material and more particularly to a fabric for ground stabilisation supporting vegetation.

Ground stabilisation materials are known which provide a support for vegetation. A problem which exists with known materials is that when it is required to provide a support for vegetation it is extremely difficult to sew the seeds necessary for the growth of the vegetation within the fabric.

It is an object of the present invention to provide a material in which seeds may be sewn in a manner providing protection for the seeds and good distribution of the seeds.

The present invention therefore provides a ground stabilisation fabric comprising a needle punched fabric having a reinforcing scrim in a base portion of the fabric and in which the fabric is formed with rows of loops of fibres upstanding from the base of the fabric.

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Preferably the fabric is formed with loops of heavy denier fibre.

In a particular embodiment the fabric is formed with fibres which are biodegradable to produce after several years a natural grass.

5       Alternatively the fabric may be formed of all synthetic fibres.

Preferably the needled fabric is formed with furrows formed by the loops to hold seeds during germination.

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In a preferred embodiment the needled fabric is formed with heavy denier fibres in rows allowing particulate fill materials and seeds to penetrate down to the base formation.

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Preferably the needled fabric is of sufficient pile depth to retain particulate fill material and assist in the protection of root formation.

20       Preferably the needled fabric is formed from heavy denier fibres to hold rows of pile vertical during a filling operation.

The fabric may be formed with apertures in the base  
25       formation to enable roots to penetrate.

Embodiments of the present invention will now be described, by way of example with reference to the

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accompanying drawings in which:-

Figure 1 shows a ground stabilisation material according to the present invention in side cross-section;

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Figure 2 shows the ground stabilisation material of Figure 1 in cross-section along line A-A;

Figure 3 shows the material of Figures 1 and 2 when  
10 immediately laid and filled;

Figure 4 shows the material of Figure 3 as the vegetation grows;

15 Figure 5 shows in greater detail part of the embodiment of Figures 3 and 4.

With reference now to Figures 1 and 2 the ground stabilisation material comprises a fabric 10 formed from a  
20 fibre base 20 with a support scrim 30 and having loops 40 formed on one face. The support scrim 30 can be formed at any depth in the base layer 20.

The loops 40 are formed on one face in rows and may be  
25 for example 3 mm to 35 mm in depth dependent on conditions of use. The loops may be formed in double rows 42, 44 (Figure 2) with a furrow 50 formed between each double row formation.

The fabric is preferably manufactured in long rolls of a defined width (e.g. 2 or 4 metres wide and 50 metres length) and the fabric is laid on ground surface 100 (Figure 3) with in this embodiment the fibre base 20 underneath.

With reference now to Figures 3 to 5 in use, after laying grass seed 52 (or other suitable seed) is broadcast over the fabric and a substantial quantity of the grass seed will fall into the bottom of furrow 50. Particulate fill material 60 is then spread over the fabric and this particulate fill material 60 will fill in all the furrows and also any spaces 46 (Figures 1 and 2) in the ribs 40.

The grass seed when sown is therefore protected from the environment when the particulate fill material is worked into the fabric by brushing, raking or vibrating until an even cover is reached.

The grass seed 52 when germinating is able to penetrate the scrim 20 with its roots 54 and the grass 56 is able to grow freely upwardly in furrows 50, the central node 58 of each grass plant being situated within each furrow and thereby being further protected from damage.

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The present invention thus provides a fabric for ground stabilisation to support vegetation comprising a three dimensional fabric of varying thickness from 5 mm to

40 mm in which fibres are needle punched through a scrim to form rows of loops.

Loops formed in rows on one side of the material are  
5 essentially vertical in orientation and allow particulate fill materials to penetrate to the scrim base so forming furrows or beds for accepting seeds.

The fabric has apertures in the base construction  
10 which enable the roots to readily penetrate into the ground below.

The penetration of the particulate material and its retention by the loops of fibre stiffen the fabric matrix  
15 and stabilise its condition when in situ.

This stiffness and stability prevents erosion during the germination period of the planting, and thereafter.

20 The scrim gives strength to the base fibre construction particularly in the lighter weight fabrics. This makes handling of the rolls on site easier and assists in preventing wrinkles or fabric tearing during laying.

25 The material may be constructed from all synthetic fibres or a combination of synthetic and natural fibres.

Fibres forming the pile are mainly coarse denier

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usually 65 - 110 denier to give good stance to the rib  
formation.

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CLAIMS

1. A ground stabilisation fabric comprising a needle punched fabric having a reinforcing scrim in a base portion of the fabric and in which the fabric is formed with rows  
5 of loops of fibres upstanding from the base of the fabric.
2. A ground stabilisation fabric as claimed in claim 1 in which the fabric is substantially formed with loops of heavy denier fibre of between 65 to 110 denier.
- 10 3. A ground stabilisation material as claimed in claim 1 in which the fabric is formed with fibres which are biodegradable to produce after several years a natural grass.
- 15 4. A ground stabilisation material as claimed in claim 1 in which the fabric is formed of all synthetic fibres.
5. A ground stabilisation material as claimed in any one  
20 of claims 1 to 4 in which the needled fabric is formed with furrows formed by the loops to hold seeds during germination.
6. A ground stabilisation material as claimed in claim 5  
25 in which the needled fabric is substantially formed with heavy denier fibres in rows allowing particulate fill materials and seeds to penetrate down to the base formation.

7. A ground stabilisation material as claimed in claim 6 or 7 in which the needled fabric is of sufficient pile depth to retain particulate fill material and assist in the protection of root formation.

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8. A ground stabilisation material as claimed in claim 7 in which the needled fabric is formed from heavy denier fibres to hold rows of pile vertical during a filling operation.

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9. A ground stabilisation material as claimed in any one of claims 1 to 8 in which the fabric is formed with apertures in the base formation to enable roots to penetrate.

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10. A ground stabilisation material substantially as described with reference to the accompanying drawings.

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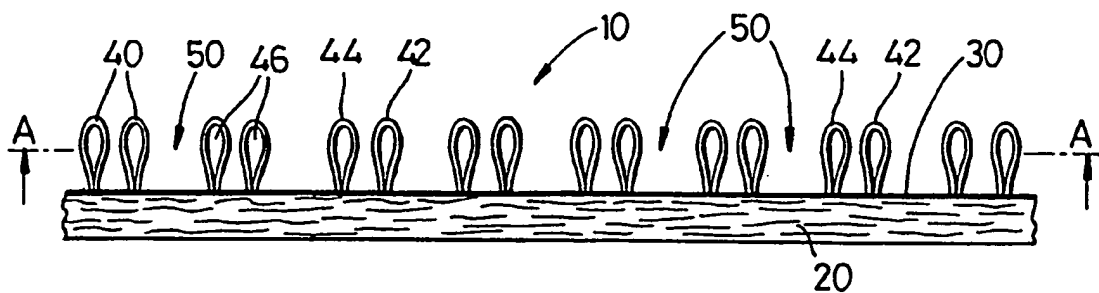


Fig. 1

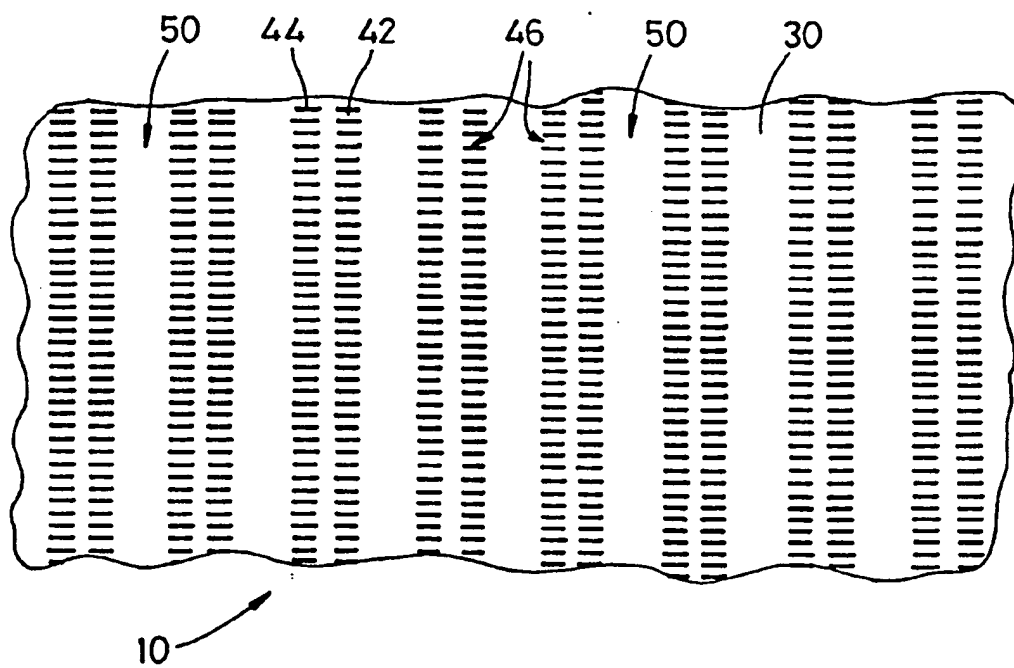
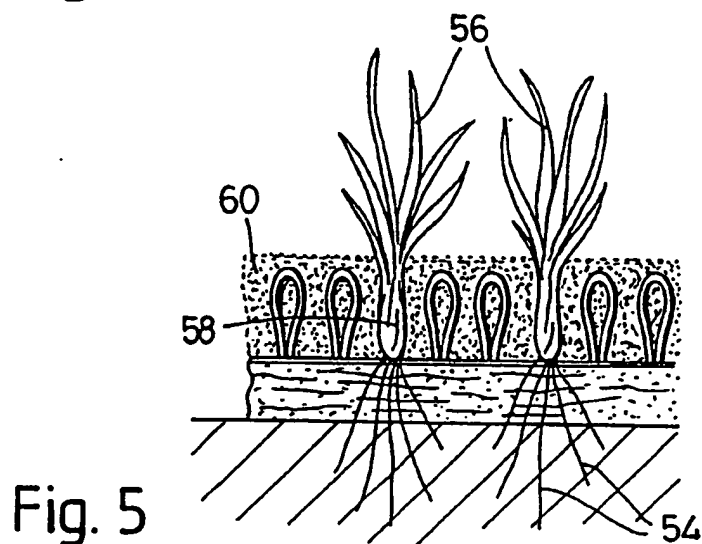
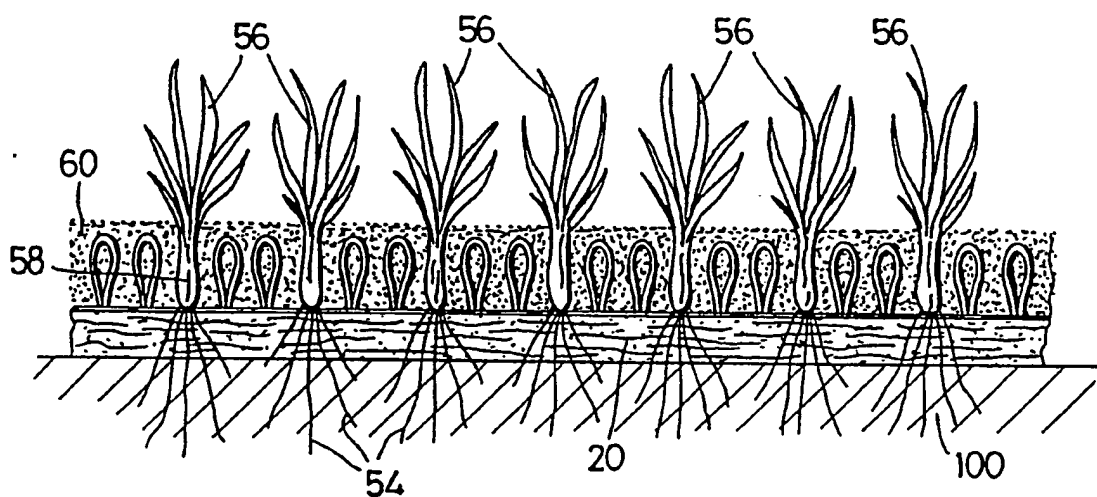
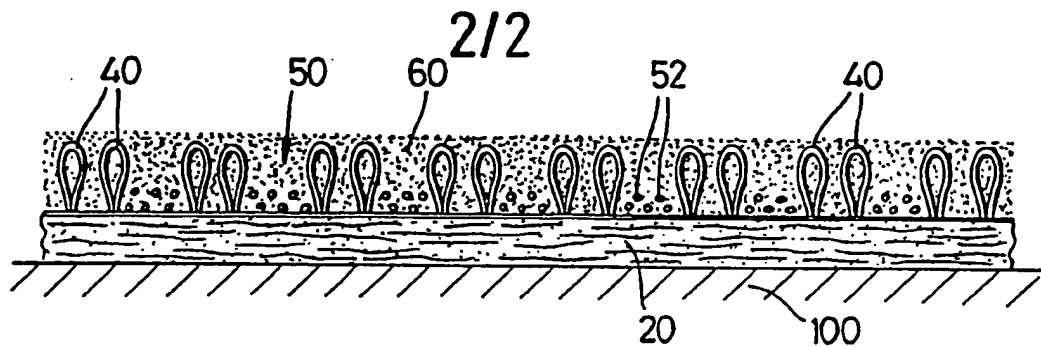


Fig. 2

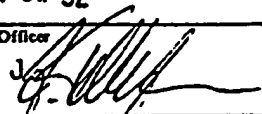
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## INTERNATIONAL SEARCH REPORT

PCT/GB 91/01608

International Application No

<b>I. CLASSIFICATION OF SUBJECT MATTER</b> (If several classification symbols apply, indicate all) <sup>6</sup>		
According to International Patent Classification (IPC) or to both National Classification and IPC Int.Cl. 5 E02D17/20; E01C13/00		
<b>II. FIELDS SEARCHED</b>		
Minimum Documentation Searched <sup>7</sup>		
Classification System	Classification Symbols	
Int.Cl. 5	E02D ; E01C ; E02B ; A01G	
Documentation Searched other than Minimum Documentation to the extent that such Documents are Included in the Fields Searched <sup>8</sup>		
<b>III. DOCUMENTS CONSIDERED TO BE RELEVANT<sup>9</sup></b>		
Category <sup>10</sup>	Citation of Document, <sup>11</sup> with indication, where appropriate, of the relevant passages <sup>12</sup>	Relevant to Claim No. <sup>13</sup>
X	EP,A,0 174 755 (NOTTINGHAMSHIRE COUNTY COUNCIL) 19 March 1986	1,4-7,9
A	see page 4, line 27 - page 7, line 6; figures 1-5	2,8
A	--- AU,B,598 656 (SUPER-GRASSE) 28 June 1990 see page 2, line 20 - line 28 see page 4, line 14 - page 5, line 11; figures 1,2	1,2,4,8
A	--- DE,A,3 631 716 (KRUPKA) 31 March 1988 see column 4, line 40 - column 5, line 20; figures 1,2	3-5,7,9
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<b>IV. CERTIFICATION</b>		
Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report	
20 DECEMBER 1991	29. 01. 92	
International Searching Authority	Signature of Authorized Officer	
EUROPEAN PATENT OFFICE	TELLEFSEN J. 	

**ANNEX TO THE INTERNATIONAL SEARCH REPORT  
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Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP-A-0174755	19-03-86	AU-B- 575680	04-08-88
		AU-A- 4664085	27-02-86
		CA-A- 1253896	09-05-89
<hr/>			
AU-B-598656	28-06-90	AU-A- 1409888	29-09-88
<hr/>			
DE-A-3631716	31-03-88	None	
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